DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection

N589033903

FACILITY: Ottawa Generating Station		**SRN / ID:** N5890
LOCATION: 15362 68th Avenue, COOPERSVILLE		**DISTRICT:** Grand Rapids
CITY: COOPERSVILLE		**COUNTY:** OTTAWA
CONTACT: Jake Ripke , Regional Manager		**ACTIVITY DATE:** 03/24/2016
STAFF: David Morgan	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** MAJOR
SUBJECT:		
RESOLVED COMPLAINTS:		

At 9:00 A.M. on March 24, 2016, Air Quality Division staff Dave Morgan conducted a scheduled inspection of the Ottawa Generating Station located in Coopersville. The purpose of the inspection was to determine the facility's compliance with Renewable Operating Permit No. MI-ROP-N5860-2013 and state and federal air pollution regulations and to observe operating conditions during the stack test being performed. Accompanying AQD staff on the inspection of the Ottawa Generating Station was Jake Ripke, Regional Manager, Ray Workman, Operation Technician and Scott Webster, Operation Technician.

FACILITY INFO

The Ottawa County Farms Landfill (OCFL) is a municipal solid waste landfill, with a design capacity of 13.0 million cubic meters, subject to the requirements of 40 CFR Part 60, Subpart WWW. The landfill is also subject to the National Emission Standard for Hazardous Air Pollutants under 40 CFR Part 63, Subpart AAAA for Municipal Solid Waste Landfills. Because the Non-methane Organic Compound (NMOC) emissions exceed 50 megagrams per year OCFL is required to have a gas collection and control system in place. Currently gas from closed and active portions of the landfill are collected by an active gas collection system and directed to the Ottawa Generating Station (OGS) where internal combustion engines burn the landfill gas to produce electricity. The Ottawa Generating Station has two separate buildings which house equipment to treat landfill gas and burn the gas in engines to produce electricity. The OGS also operates an open flare.

Excess gas is used by Resource Recovery Corporation (RRC) to recover metal and sand from used foundry sand. The OCFL and OGS are considered one stationary source, despite having two separate ROPs. RRC is not considered part of the stationary source.

FGTREATMENTSYS (EULFTREATMENT1 and EULFTREATMENT2):
Under 40 CFR 60.752(b)(2)(iii)(C), landfill gas may be controlled by routing the collected gas to a treatment system that processes the collected gas for subsequent sale or use. The USEPA considers de-watering, filtering through at least a 10 micron screen, and compression prior to the combustion of the gas in energy recovery devices such as boilers, process heaters, turbines, or internal combustion engines to satisfy the definition of treatment.

Each plant at the OGS contains a landfill gas treatment system. The Plant 1 (EULFTREATMENT1) treatment system consists of a 36-inch diameter condensate/liquids knockout tank for de-watering, a 42-inch diameter carbon steel scrubber tank with scrubber pad for de-watering, two AC compressors, two radiator style aftercoolers which cool the gas, a coalescing filter with 0.3-micron coalescing filters, and a fuel gas dryer for gas de-watering and temperature control. The Plant 2 (EULFTREATMENT2) treatment system contains a 24-inch diameter condensate/liquids knockout tank for de-watering, a 42-inch diameter carbon steel scrubber tank with scrubber pad for de-watering, one AC compressor, one radiator style aftercoolers which cool the gas, a 0.3-micron coalescing filter, and a fuel gas dryer for gas de-watering and temperature control.

Preventative maintenance is conducted on the treatment systems in accordance with the maintenance plan. According to OGS personnel, the coalescing filters are changed once the pressure drop reaches 3.0 psi across the filters, generally. Upon inspection, the pressure drop on the Plant 1 filter was 3.0 psi and Plant 2 was 1.0 psi. Mr. Ripke indicated that the filter on Plant 1 was due for replacement and was on their maintenance task list for the week. When the filter is replaced, the process takes about five minutes and gas is bypassed around the filter. The engines are still operating during filter replacement.

The presence of a treatment system excludes the engines from the testing and control requirements contained in the NSPS. However, any atmospheric vent from the gas treatment system is subject to the requirements.

Startup, Shutdown, Malfunction:
The OGS maintains a start-up, shutdown, malfunction plan as required by 40 CFR 63, Subpart AAAA, for all

equipment. It is noted however, that an SSM plan is not required for the engines or the flare under Subpart AAAA because the treatment system is installed prior to both. However, when the engines are shutdown, there may be no flow through the treatment system. Shutdown event records were reviewed on site. Shutdown events were primarily due to power outages and high oxygen in the gas. Although down for greater than one hour in some cases, all landfill gas was recirculated in the landfill piping. The OGS response to the events was consistent with the SSM plan and documented.

RICE Engines:
Plant 1 consists of five Caterpillar G3516LE internal combustion engines that were originally installed in 1992 under Rule 285(g) permit exemption because each engine has a heat input capacity of 8.6 Million Btu/hr which is below the permitting threshold of 10 Million Btu/hr. A sixth engine was originally installed but was removed in September 2013. If a sixth engine is installed in Plant 1, then the unit will be considered a new emission unit and a new source review permit may be necessary depending on the type of engine installed.

Plant 2 consists of one Caterpillar G3520C internal combustion engine (EURICEENGINE7) which was initially installed in 2006. Engine 7 was replaced in August 2014 with a rebuilt engine with new serial number and manufacture date (see engine table at the end of the report). At the time of the inspection EURICEENGINE7 was undergoing a performance test.

A second G3520 engine (EURICEENGINE8) to be installed in Plant 2 was originally permitted under PTI No. 203-10 and rolled into ROP MI -ROP-N5890-2013. This unit has not been installed and the 18 months installation window for the unit has passed.

Any landfill gas that is not burned in the engines is routed to an open flare. (A summary table of OGS engines is at the end of this report.)

OGS monitors the gas flow rate from the main header as well as the gas flow rate into the engines on a continuous basis. Each engine processes approximately 300 cubic feet of landfill gas per minute and the gas is analyzed at regular intervals to verify the quality of the gas. Also, the company monitors the exhaust gas temperature of each engine on a continuous basis.

At the time of the inspection, Plant 1 was processing a total gas flow of 1,327 scfm with a methane content of 56.2% and oxygen content of 0.49%. Plant 2 was processing a total gas flow of 475 scfm with a methane content of 59.7% and oxygen content of 0.2%. The open flare had operated intermittently that day with a gas flow ranging from 67 scfm to 120 scfm.

Engine 7 is limited to a landfill gas feed rate of 264.4 million cubic feet per year based on a 12-month rolling time period as determined at the end of each month. From April 2015 through March 2016, the unit had a gas feed rate of 247.32 million cubic feet which is below the applicable permit limit of 264.4 million cubic feet.

Records are maintained on-site in accordance with with the preventative maintenance plan. A daily record sheet is used to record various engine and treatment system parameters including kilowatt output, fuel flow, landfill gas quality, coalescing filter pressure drop and others. It is noted that the company uses non-resettable hours meters to record engine hours. The company maintains appropriate records to determine compliance with the permit.

Based on facility records and Granger personnel, a preventative maintenance program is conducted. Routine maintenance is conducted on the engines in accordance with manufacturer and company specifications which include replacing engine spark plugs, oil, and lubrication. Maintenance is also conducted on an as needed basis. In addition, a "top-end" overhaul, which includes replacing/cleaning cylinder heads, turbochargers and valves, is conducted on each engine after approximately 10,000 hours of operation. This is typically completed on site.

"Major" overhauls are conducted every 50,000 to 100,000 hours of operation. A major overhaul includes all of the work of a top end overhaul plus disassembling all of the bearings, seals, gaskets, and components that wear and may even include replacing the crankshaft. When an engine is due for a major overhaul, it is swapped out with another overhauled engine. When the engine is swapped, it is removed from the facility and either replaced with an engine with a different serial number and manufacture date or the same unit is brought back after being rebuilt and will have the same serial number and manufacture date. Swapping engines in this manner is an industry standard for maintaining the engines.

All maintenance records were reviewed on-site and it appeared that maintenance was conducted in accordance with the Preventative Maintenance Plan. It is noted that maintenance records are now captured electronically in a

centralized software system.

The following is a "top-end" maintenance schedule for all engines:

Engine	Maintenance Type	Schedule
1	top-end	2/2016
3	top-end	6/2016
4	top-end	3/2016
5	top-end	2017
6	top-end	7/2016
7	top-end	2/2016

Stack Testing:
A stack test was last performed on January 23, 2014 pursuant to ROP No. MI-ROP-N5890-2013, Special Condition No. V.1 and 40 CFR Part 60, Subpart JJJJ. Per Subpart JJJJ, affected engines are also to be tested every 8,760 hours or three years which ever comes first. For NOx, emissions were 2.67 lb/hr (4.92 lb/hr limit), CO emissions were 13.77 lb/hr (16.2 lb/hr limit) and VOC emissions were 0.84 lb/hr (3.2 lb/hr). All emissions were within applicable limits.

During the inspection, a similar performance test was being conducted by Derenzo Environmental Services. At the time, AQD staff noted the following operational parameters which were also being recorded by Granger personnel.

Run	Time	Generator Output (kilowatt)	Landfill Gas Flow (scfm)	Methane %	Inlet flow (scfm)	Air to Fuel Ratio
1	8:20	1606	479	59.8	18	8.9
1	8:35	1607	473	59.7	19	8.9
1	8:50	1616	477	59.7	19	8.9
1	9:05	1610	477	59.7	19	8.9
1	9:20	1600	476	59.5	19	8.9
2	9:49	1604	477	59.8	19	8.9
2	10:04	1602	473	59.7	19	8.9
2	10:19	1604	473	59.8	19	8.9
2	10:34	1618	478	59.8	19	8.9
2	10:49	1620	476	59.8	19	8.9

The engine appeared to be operating properly. Stack test results are pending.

Stack dimensions for EURICEENGINE7 appear to meet the minimum height of 25 feet above ground and a maximum diameter of 14.5 inches.

40 CFR Part 60, Subpart JJJJ:
Engine 7 is subject to the requirements of 40 CFR Part 60, Subpart JJJJ based on the engine installation and manufacture date. The company submitted an initial notification on June 6, 2012. The company performed an initial performance test for Subpart JJJJ on April 14, 2011 which was within 180 days of the Engine 7 installation date of October 2010. The most recent performance test was conducted in January 2014. Granger appears to be meeting other applicable requirements of Subpart JJJJ at this time.

40 CFR Part 63, Subpart ZZZZ:
In May 2012 it was determined that the potential to emit of formaldehyde from Engines 1 through 7 is 28.9 tons which is above the major source threshold of 10 tons for a single HAP. Because the engines are considered a major source of HAPs and were installed after December 12, 2002, they are subject to the requirements of 40 CFR Part 63, Subpart ZZZZ. The company submitted an initial notification on June 6, 2012. Granger appears to be meeting Subpart ZZZZ requirements at this time.

Open Flare (EUOPENFLARE):
OGS also operates an open flare which is used when there is extra gas that the engines cannot process, or in the event of a catastrophic failure of the engines and bypass is needed. Since the flare is installed after the treatment

system, the flare is not subject to the testing and control requirements. Gas going to the flare is sent though the treatment system in Plant 2. At the time of the inspection, the flare was operating from 67 to 120 scfm. There were no visible emissions from the flare.

The company has a separate monitor on the gas flow rate to the flare when it is used, but does not monitor the presence of a pilot flame. A pilot flame is not lit continuously in the flare.

SUMMARY

OCFL appears to be in compliance with applicable requirements.

Engine Slot	Type	Serial #	Rating	Manufacture Date	Online Date	Installed under PTI/Rule	Known Replacement	**NSPS JJJJ**	**MACT ZZZZ**
Engine 1	Caterpillar G3516LE	4EK00134	800 Kw (1148 hp)	12/16/1993	6/21/1994	Rule 285(g)		N	Y
Engine 2	removed September 2013								
Engine 3	Caterpillar G3516LE	4EK00136	800 Kw (1148 hp)	12/10/1993	6/21/1994	Rule 285(g)		N	Y
Engine 4	Caterpillar G3516LE	4EK00126	800 Kw (1148 hp)	12/16/1993	6/21/1994	Rule 285(g)	Removed 1-23-14 and replaced 2-3-14	N	Y
Engine 5	Caterpillar G3516LE	4EK00135	800 Kw (1148 hp)	12/17/1993	6/21/1994	Rule 285(g)		N	Y
Engine 6	Caterpillar G3516LE	4EK00467	800 Kw (1148 hp)	3/23/1995	6/21/1994	Rule 285(g)		N	Y
Engine 7	Caterpillar G3520C	GZJ00681	1600 kW (2233 hp)	9/1/2005 & 2/17/2010	8/2014	173-05 (subsequently revised as 173-05A)	Removed 7-31-14	Y	Y

NAME _____ DATE 4/25/16 SUPERVISOR PAB